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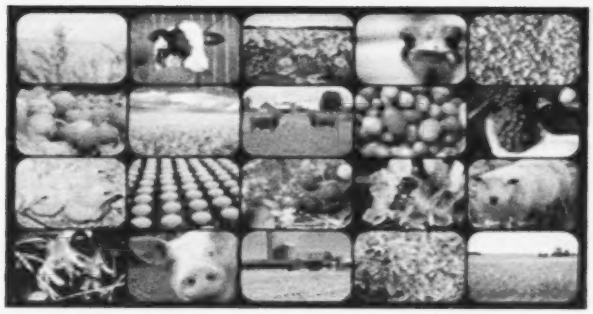
Seeding decisions harvest opportunities for Canadian farm operators



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^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
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* significantly different from reference category ($p < 0.05$)

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Seeding decisions harvest opportunities for Canadian farm operators

With innovation in crop science, production practices, and marketing, Canadian farm operators are growing a wider variety of field crops, while expanding their production area. Canada's total field crop area increased 7.0% from 2011 to 92.7 million acres in 2016.

The largest crops in terms of acreage were canola, spring wheat, alfalfa and barley. As well, pulses and soybeans have shown considerable growth, the result of market opportunities and development of seed varieties more suitable to broader environmental regions.

The Prairie Provinces led in field crop acreage, with 83.3% of the total area in 2016.

The average field crop area per agricultural operation doubled over the last 35 years. Canola acreage was almost six times larger in 2016 than it was in 1981. In 2016, lentil acreage was over 44 times greater than it was in 1981.

All references to total field crops includes hay (alfalfa and all other tame hay), unless otherwise stated.

More field crop area than ever

The total farm area in Canada was 158.7 million acres in 2016. Of the total farm area in Canada, 58.4% was devoted to field crops in 2016, up from 54.1% in 2011. Canada's total field crop area increased 7.0% from 86.6 million acres since 2011 to 92.7 million acres in 2016. When tame hay and alfalfa are excluded, field crop area increased 12.7% since 2011.

There was less than half the amount of summerfallow land in 2016 than there was in 2011. The conversion of some summerfallow land into productive land contributed to the increase in total cropland. As farm operators have adopted new tillage and crop management practices, the need for summerfallow as a moisture and pest management strategy has declined. As well, land in Manitoba and Saskatchewan that was flooded in 2011 re-entered production by 2016, contributing to the increase in total field crop area.

Oilseeds and pulses increase, while hay decreases

There are a number of factors that farm operators must consider when selecting crops to grow. These include seed and selling prices, demand and access to markets, input costs, new technologies and varieties, disease and pest management, soil conditions and improvements as well as climatic suitability. The area of cash crops, those primarily grown to be sold rather than for feed, increased since the last Census.

Of all the cash crops, oilseeds and pulses, together, increased the most, 27.4%, since 2011 from 30.1 million acres to 38.3 million acres. Oilseeds are soybeans, canola, mustard seed, sunflowers, and flaxseed. Pulses are dry field peas, chick peas, lentils, dry white beans, and other dry beans. The increase in oilseeds and pulses between 2011 and 2016 occurred in every province except for Prince Edward Island and New Brunswick.

In contrast, the production of hay, which is grown to feed livestock, declined to 14.1 million acres in 2016, down 16.6% from 2011. The decrease in hay occurred in every province between 2011 and 2016. Despite the average number of cattle per farm increasing, there were fewer farms and fewer cattle, affecting the demand for hay for feed. The total number of cattle and calves decreased 2.0% from 2011 to 12.5 million head in 2016.

Crop selection shows adaptation to changes in market conditions

Comparing 1981 with 2016, the largest crops in terms of total acreage have shifted due to a variety of factors such as domestic or international demand, profitability and development of higher yielding varieties. Spring wheat (excluding durum), barley and oats have moved down in rank, while oilseeds and pulses have moved up in rank.

While spring wheat was the largest crop by area in 1981, it moved down to the second-largest by 2011 (Table 1). Canola moved from seventh-largest crop in 1981 to the largest crop in 2011, and continued to be the largest crop in 2016. Soybeans and lentils were not widely grown in 1981, but have become the sixth and seventh-largest crops in 2016. While soybeans and lentils moved into the top eight crops in Canada, oats and corn for grain moved out of the top eight.

Table 1
Rankings of principal field crops, Canada, 1981 and 2016

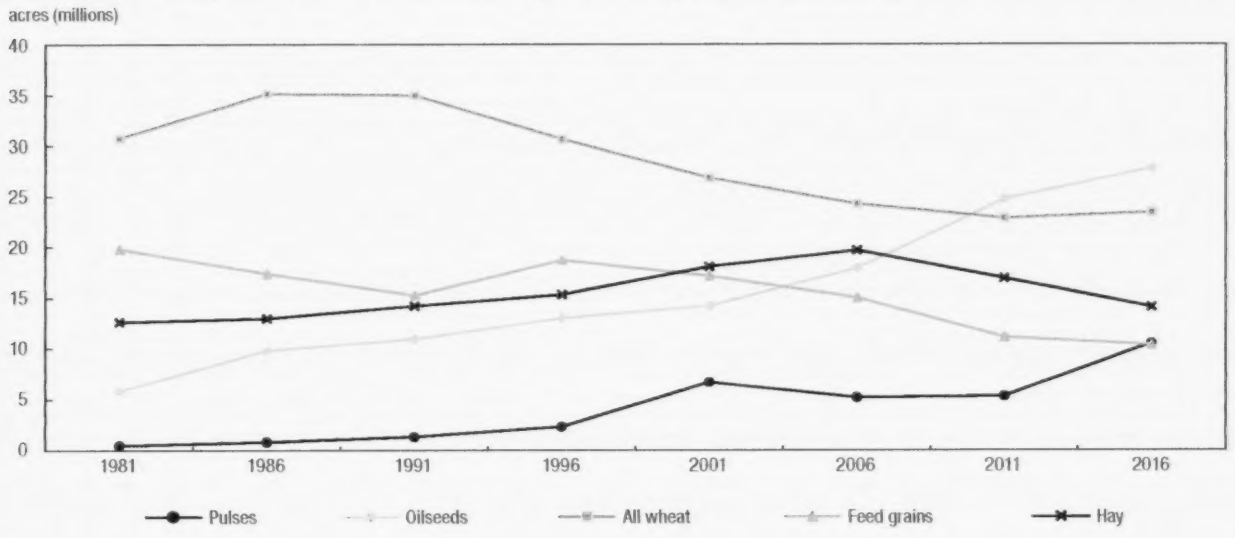
1981			2016		
Rank	Field crop	Acres	Rank	Field crop	Acres
1	Spring wheat (excluding durum)	25,748,008	1	Canola (rapeseed)	20,606,778
2	Barley	13,484,516	2	Spring wheat (excluding durum)	15,693,427
3	All other tame hay	6,353,498	3	Alfalfa and alfalfa mixtures	9,276,755
4	Alfalfa and alfalfa mixtures	6,287,122	4	Barley	6,696,068
5	Oats	5,002,978	5	Durum wheat	6,062,953
6	Durum wheat	4,207,429	6	Soybeans	5,615,864
7	Canola (rapeseed)	3,471,547	7	Lentils	5,584,808
8	Corn for grain	2,821,253	8	All other tame hay	4,851,167

Sources: CANSIM tables 004-0003 and 004-0213.

Total oilseed area increased 374.5% from 5.9 million acres in 1981 to 27.8 million acres in 2016 (Chart 1). Total area of pulses in Canada was 21 times larger in 2016 than it was in 1981, having increased from 498,188 acres to 10.5 million acres.

The area of all wheat (spring wheat, durum wheat and winter wheat) decreased 23.8% between 1981 and 2016, falling from 30.8 million acres to 23.4 million acres. Total area of feed grains (oats, barley and mixed grains) decreased 47.7% between 1981 and 2016, from 19.8 million acres to 10.4 million acres.

Chart 1
Total seeded area of pulses, oilseeds, all wheat, feed grains, and hay, Canada, 1981 to 2016



Source: Census of Agriculture (3438).

Improvements in seed varieties and crop management have increased crop yields, which made farms more efficient and able to grow more on less land. The average yield for all wheat increased from 29.7 bushels per acre to 53.2 bushels per acre (Table 2). This increase in yield resulted in Canadian farms producing 27.9% more wheat in 2016 than in 1981 (an increase of 6.9 million tonnes), but on 23.8% less land.

Table 2
Total area, estimated yield and estimated production of largest field crops, Canada, 1981 and 2016

	Total area		Average yield		Estimated production	
	1981	2016	1981	2016	1981	2016
Field crop	acres		bushels per acre		tonnes	
All wheat	30,769,618	23,436,513	29.7	53.2	24,802,200	31,728,600
Canola (rapeseed)	3,471,547	20,606,778	23.5	42.3	1,848,500	18,423,600
Barley	13,484,516	6,696,068	46.6	73.4	13,724,150	8,783,600
Soybeans	699,095	5,615,864	32.3	44.1	606,800	6,462,700
Lentils	125,562	5,584,808	16.2	20.8	55,700	3,248,200

Sources: CANSIM tables 001-0010, 001-0017 (accessed April 13, 2017) and Census of Agriculture (3438).

The majority of Canada's largest crops were grown for export. An equivalent of two-thirds of the soybeans produced in 2016 were exported in the same year (Table 3). In 2016, the combined export value of all wheat and canola was $11.6 billion.

Table 3
Total exports of selected field crops, Canada, 2016

	Export quantity	Export value
Field crop	tonnes	dollars
All wheat (other than seed for sowing)	19,605,166	5,935,993,057
Canola (low erucic acid rapeseed)	10,542,656	5,632,042,775
Barley (other than seed for sowing)	1,197,274	383,890,942
Soybeans (other than seed for sowing)	4,356,380	2,461,048,715
Lentils, dried, shelled	2,052,957	2,125,313,690

Sources: Canadian International Merchandise Trade Database, tables 980-0007, 980-0010 and 980-0012 (accessed April 13, 2017).

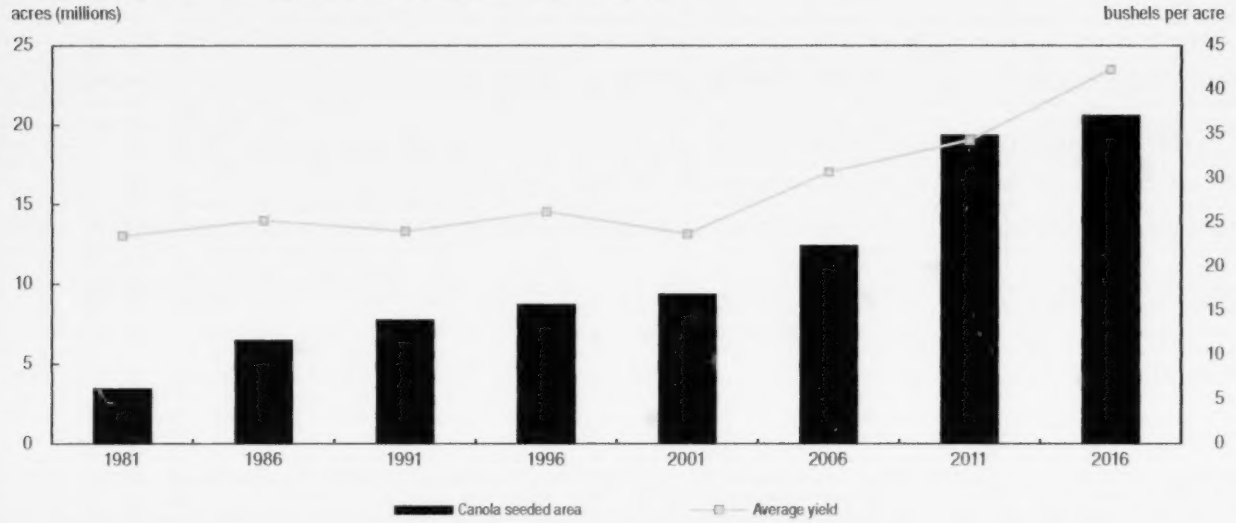
Canola strengthens its lead as Canada's largest crop

Canola is a variety of rapeseed that was developed in Canada in the 1970s to minimize compounds that are undesirable in an edible oil. Since the Census of Agriculture first began following the crop in 1956, the area planted to rapeseed, and later canola, has expanded steadily. The production of canola in Canada is concentrated in the Prairie Provinces (Manitoba, Saskatchewan and Alberta).

In 2011, canola acreage surpassed that of spring wheat (excluding durum) for the first time in Census of Agriculture history. The gap between the two continued to widen in 2016, as canola area increased 6.4% to 20.6 million acres and spring wheat area (excluding durum) declined 7.0% to 15.7 million acres. Canola accounted for 22.2% of the total field crop area in Canada in 2016, while spring wheat (excluding durum) decreased to 16.9%. In Saskatchewan spring wheat (excluding durum) decreased 16.3% to 6.7 million acres, while canola increased 13.2% to 11.1 million acres between 2011 and 2016.

Farm operators have leveraged improvements in seed varieties and crop management to increase the average yield of canola from 23.5 bushels per acre in 1981 to 42.3 bushels per acre by 2016 (Chart 2).

Chart 2
Total seeded area and average yield of canola, Canada, 1981 to 2016



Sources: CANSIM tables 004-0003, 004-0213 and 001-0017 (accessed April 13, 2017).

The most recent data available from the Food and Agriculture Organization of the United Nations identified Canada as the world's largest producer of canola in 2014. Canada's estimated production of canola increased from 1.8 million metric tonnes in 1981 to 18.4 million metric tonnes in 2016.

Canada exported 10.5 billion kilograms of canola (low erucic acid rapeseed) in 2016. The largest importers of Canadian canola seeds were China, Japan and Mexico in 2016 (Table 4). Exports of Canadian canola seeds to China have increased 165.6% between 2011 and 2016, while over the same period, Canadian exports of canola seeds to the world increased 33.7%. The amount of canola seeds exported in 2016 was equivalent to 57.2% of the canola produced in 2016.

Table 4
Total exports of Canadian canola (low erucic acid rapeseed) by major markets, 2016

		Canola (low erucic acid rapeseed)		
		Quantity	Canola exports	Export value
Rank	Export market	kilograms	percent	dollars
	World	10,542,655,879		5,632,042,775
1	China	3,542,468,324	33.6	1,916,273,942
2	Japan	2,280,644,844	21.6	1,236,693,886
3	Mexico	1,477,680,029	14.0	760,914,912
4	Pakistan	1,346,371,160	12.8	704,493,862
5	United Arab Emirates	629,933,126	6.0	332,005,776

Source: Canadian International Merchandise Trade Database, table 980-0012 (accessed April 13, 2017).

Canola is processed to separate the oil from the meal (cake). Both products are exported by Canada. Of the 4.4 billion kilograms of canola (rapeseed) cake exported in 2016, 81.9% was exported to the United States (Canadian International Merchandise Trade Database, table 980-0023, 2016). Canada exported 1.5 billion kilograms of refined canola (rapeseed) oil and 1.4 billion kilograms of crude canola (rapeseed) oil in 2016 (Statistics Canada. 2017. Canadian International Merchandise Trade Database, accessed May 10, 2017). The United States was the largest export market for Canadian refined canola (rapeseed) oil, accounting for 92.4% of refined canola exports in 2016. The largest importers of Canadian crude canola oil were China and the United States, accounting for 41.5% and 36.0%, respectively, of all crude canola oil exports in 2016.

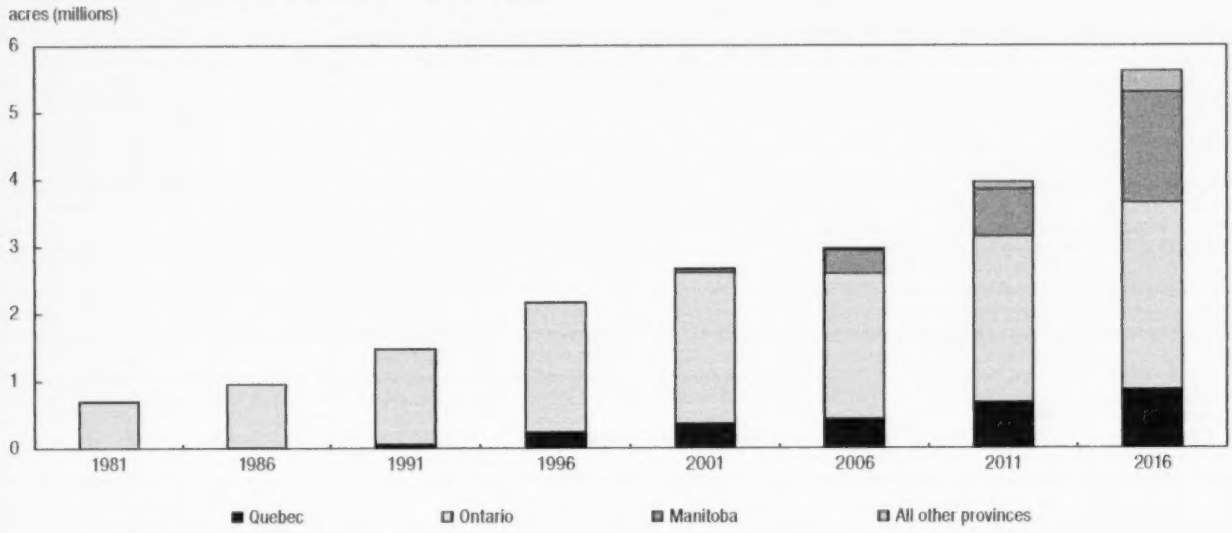
Soybean growth includes a move west

Since data was first collected in 1941, soybean area increased in every Census except one in 1956. While older varieties of soybeans were mostly restricted to the long and warm growing season of southern Ontario, the development of varieties that mature earlier and tolerate cooler climates expanded the geographic range of soybean production. In 2016, soybeans were the sixth-largest field crop in Canada in terms of area, accounting for 6.1% of Canada's total field crop area.

Soybean acreage increased 41.9% between 2011 and 2016, rising 1.7 million acres to 5.6 million acres. Ontario continued to have the largest soybean area with 2.8 million acres, just under half of Canada's soybean area in 2016. Recently developed soybean varieties are able to perform well in locations where previously soil and climate conditions limited growth. This has resulted in the westward expansion of the soybean growing area. Between 2011 and 2016, soybean acreage in Manitoba expanded 133.4%, increasing from 705,032 acres in 2011 to 1.6 million acres in 2016 (Chart 3).

The average yield of soybeans increased from 32.3 bushels per acre in 1981 to 44.1 bushels per acre in 2016, an increase of 36.5%.

Chart 3
Total soybean seeded area by province, 1981 to 2016



Sources: CANSIM tables 004-0003 and 004-0213.

Canada was the seventh-largest producer of soybeans in the world in 2014, according to the Food and Agriculture Organization of the United Nations. The estimated production of soybeans in Canada increased from 606,800 metric tonnes in 1981 to 6.5 million metric tonnes in 2016.

Canada exported 4.4 billion kilograms of soybeans in 2016. China was the largest importer of Canadian soybeans followed by Japan and the Netherlands (Table 5). Canadian exports of soybeans to China have increased 120.7% between 2012 and 2016, while exports of Canadian soybeans worldwide increased 29.5% over the same period. The amount of soybeans exported in 2016 was equivalent to 67.4% of the soybeans produced in 2016.

Table 5
Total exports of Canadian soybeans (other than seed for sowing) by major markets, 2016

		Soybeans (other than seed for sowing)		
		Quantity	Soybeans exports	Export value
Rank	Export market	kilograms	percent	dollars
	World	4,356,379,774		2,461,048,715
1	China	1,787,006,911	41.0	947,551,977
2	Japan	335,836,474	7.7	266,875,158
3	Netherlands	322,570,272	7.4	156,854,449
4	Italy	199,820,870	4.6	103,762,735
5	United States	199,031,425	4.6	120,874,656

Source: Canadian International Merchandise Trade Database, table 980-0012 (accessed April 13, 2017).

Canada's pulses on Asian plates

Pulses have gained popularity among Canadian farm operators. Total pulse area nearly doubled across Canada between 2011 and 2016 from 5.3 million acres to 10.5 million acres. A growing export demand has encouraged farmers to grow pulses, particularly lentils and dry field peas. In addition, pulse crops are beneficial in crop rotation as they add nitrogen to the soil and break pest cycles.

Canada exported 2.0 billion kilograms of lentils and 3.1 billion kilograms of dry field peas in 2016. India was the largest importer of Canadian lentils and dry field peas in 2016 (Table 6). Between 2011 and 2016, exports of lentils increased 76.9% and exports of dry peas increased 9.8%. The amount of lentils exported in 2016 was equivalent to 63.2% of the lentils produced in 2016.

Table 6
Total exports of Canadian lentils and dry field peas by major markets, 2016

	Lentils			Dry field peas	
		Quantity			Quantity
Rank	Export market	kilograms	Rank	Export market	kilograms
	World	2,052,956,928		World	3,131,885,485
1	India	569,571,563	1	India	1,334,904,865
2	Turkey	389,741,145	2	China	1,007,139,294
3	United Arab Emirates	202,641,365	3	Bangladesh	290,878,350
4	Bangladesh	153,340,246	4	United States	111,003,993
5	Pakistan	130,712,895	5	Cuba	81,000,000

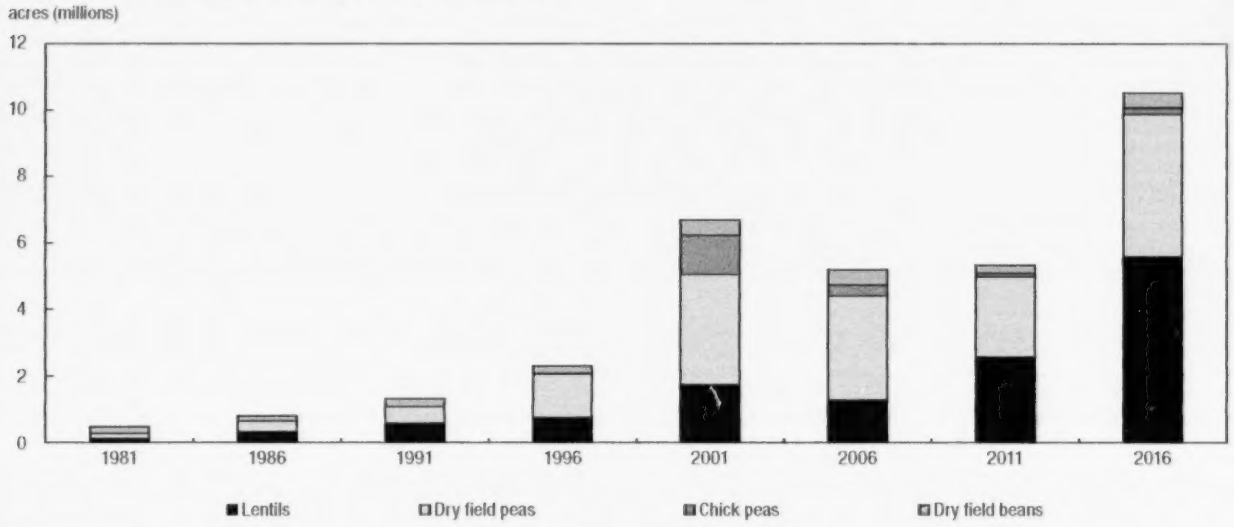
Source: Canadian International Merchandise Trade Database, table 980-0007 (accessed April 13, 2017).

Total pulse area increased by 10.0 million acres since 1981 (Chart 4), mainly from lentils and dry field peas. Lentils gained 5.5 million acres between 1981 and 2016, while dry field peas increased 4.1 million acres. Lentil acreage was over 44 times greater in 2016 than it was in 1981, while dry field pea acreage was over 27 times greater in 2016 than in 1981.

Pulses accounted for 11.3% of total field crop area in 2016. Ontario strengthened its lead for white beans with 51.6% of the total white bean area in Canada. Manitoba moved into the lead for other dry field beans, with 27.8% of Canada's total dry field bean area. Saskatchewan continued to lead with the highest percentage area of dry field peas (50.3%), chick peas (89.3%), and lentils (91.4%) in Canada.

The change in the mix of pulses grown in Canada over time demonstrates farm operators' ability to respond to evolving domestic and international market conditions.

Chart 4
Seeded area of selected pulse crops, Canada, 1981 to 2016



Source: Census of Agriculture (3438).

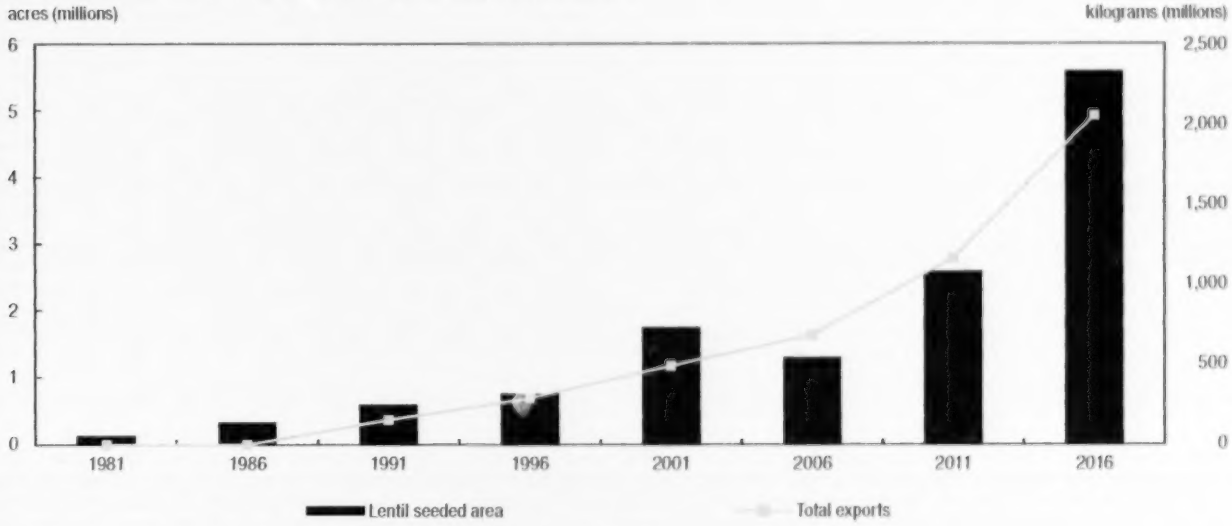
Growing lentils to feed the export market

Lentil acreage more than doubled to 5.6 million acres since 2011, increasing by 3.0 million acres. This was the largest increase of any field crop. Dry field peas saw the second-largest increase of 1.9 million acres to a Canada total of 4.3 million acres in 2016.

Since 2011, lentils moved from 10th-largest crop to seventh-largest crop in Canada. In Saskatchewan, which reported 43.7% of all field crops in 2016, lentils were the third-largest crop having moved up two spots since 2011.

With large export markets in western and southern Asia, primarily India, the increase in the quantity of exported lentils was in line with the increase in lentil area seen in Canada (Chart 5). The quantity of lentils exported by Canada in 2016 was over 13 times more than it was in 1991, the first reference year for lentil export data in a census year. According to Food and Agriculture Organization of the United Nations, Canada was the largest producer of lentils in the world in 2014.

Chart 5
Total exports and seeded area of lentils, Canada, 1981 to 2016



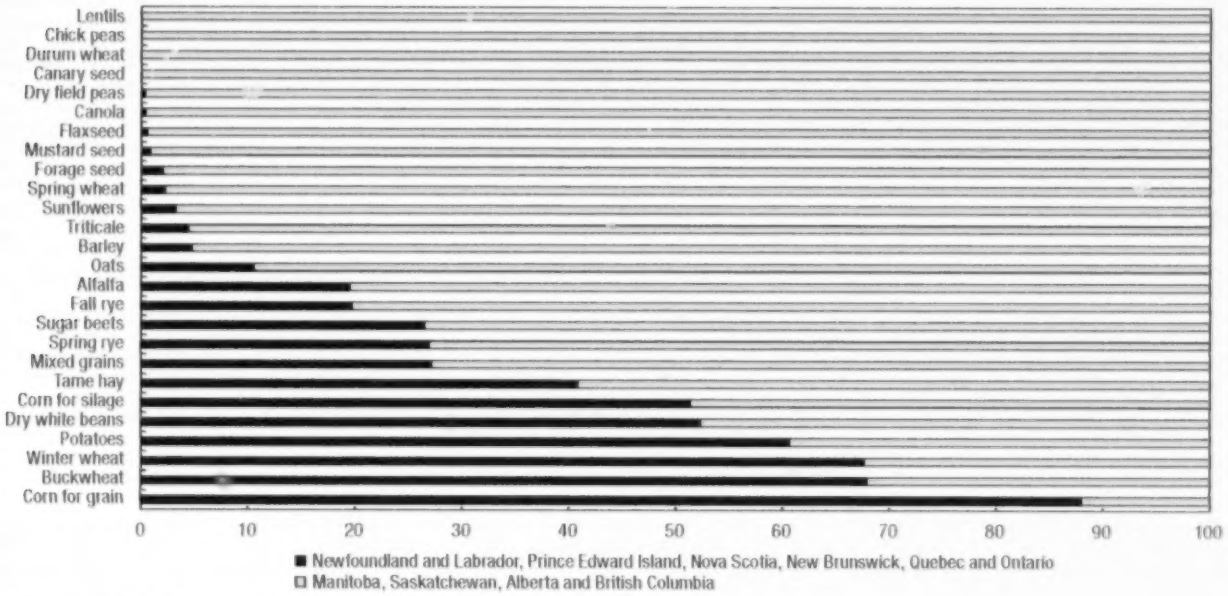
Sources: Census of Agriculture (3438) and Canadian International Merchandise Trade Database, table 980-0007 (accessed April 13, 2017).

The West is largest in field crops

Of the total 92.7 million acres of field crops in Canada in 2016, 84.8% were in Western Canada (west of Ontario). There were four crops that were produced almost entirely in Western Canada: durum wheat, chick peas, lentils, and canary seed (Chart 6). Eastern Canada (east of Manitoba) also grew these crops, but the combined total area in the Eastern provinces accounted for less than 0.1% of each. Canola continued to be the leading crop in Western Canada (20.5 million acres). By comparison, it was the 14th-largest crop in Eastern Canada.

Eastern Canada reported the majority of the area of winter wheat, corn for grain, corn for silage, soybeans, dry white beans, potatoes, ginseng, and buckwheat. In 2016, Eastern Canada took the lead over Western Canada in dry white bean acreage for the first time in 20 years, and buckwheat acreage for the first time in half a century.

Chart 6
Proportion of selected field crop area seeded by region, Canada, 2016



Source: Census of Agriculture (3438).

Leading crop types vary by province, reflecting diverse growing conditions

When farm operators decide what crops to grow, many factors come into play including climatic conditions, soil types, pest pressures, and market opportunities. Growing conditions vary widely across the country and farm operators select crops and varieties that perform well in their local conditions.

Comparing 1981 with 2016, hay remained the largest crop in terms of area in six provinces: the four Atlantic Provinces, Quebec, and British Columbia. However, when excluding hay, the largest field crop varied by province (Table 7). New Brunswick was the only province to have the same largest field crop in both 1981 and 2016—potatoes. Canola was the leading field crop in the Prairie Provinces in 2016, overtaking spring wheat and barley, the leading crops in 1981.

Table 7
Largest field crop seeded area by province, excluding hay, 1981 and 2016

	1981		2016	
Province	**Largest field crop**	**Acres**	**Largest field crop**	**Acres**
Newfoundland and Labrador	Potatoes	978	Corn for silage	509
Prince Edward Island	Mixed grains	84,547	Potatoes	83,326
Nova Scotia	Oats	20,980	Corn for grain	20,037
New Brunswick	Potatoes	53,793	Potatoes	46,240
Quebec	Oats	516,843	Corn for grain	980,588
Ontario	Corn for grain	2,171,777	Soybeans	2,783,443
Manitoba	Spring wheat (excluding durum)	3,658,335	Canola	3,199,644
Saskatchewan	Spring wheat (excluding durum)	15,889,294	Canola	11,069,557
Alberta	Barley	6,432,958	Canola	6,165,746
British Columbia	Barley	231,436	Spring wheat (excluding durum)	100,929

Sources: CANSIM tables 004-0003 and 004-0213.

The Atlantic Provinces continued to lead in potato production with 38.2% of the 344,776 total acres of potatoes in Canada. Prince Edward Island accounted for a quarter of potato acreage in Canada.

Quebec had the second-largest area of corn for grain, with 27.1% of the Canadian total in 2016.

Within the province of Ontario, two crops were predominant—soybeans with 31.7% of the province's field crop area and corn for grain with 24.6%. On the national scene, Ontario accounted for 64.3% of winter wheat, 59.8% of corn for grain, and 51.6% of dry white beans in Canada.

The Prairie Provinces accounted for 83.3% of Canada's total field crop area with 77.2 million acres. The largest crop in each of the Prairie Provinces was canola, which accounted for 24.4% of field crop area in Alberta, 27.3% of field crop area in Saskatchewan, and 27.8% in Manitoba.

Alberta had the largest hay area, with 29.9% of all hay area in the country.

The leading crops, excluding hay, in British Columbia were spring wheat (7.5% of field crop area) and canola (7.1% of field crop area).

Farm operators scale up

In the past 50 years, average field crop area per farm has tripled, from 159.3 acres in 1966 to 479.0 acres in 2016, reflecting economies of scale driven by fewer farm operators working a greater area of land in production. The average field crop area per agricultural operation in Western Canada was 731.1 acres, compared with 163.8 acres in Eastern Canada. Saskatchewan led in highest average field crop acreage per agricultural operation at 1,172.7 acres.

Investing in the soil

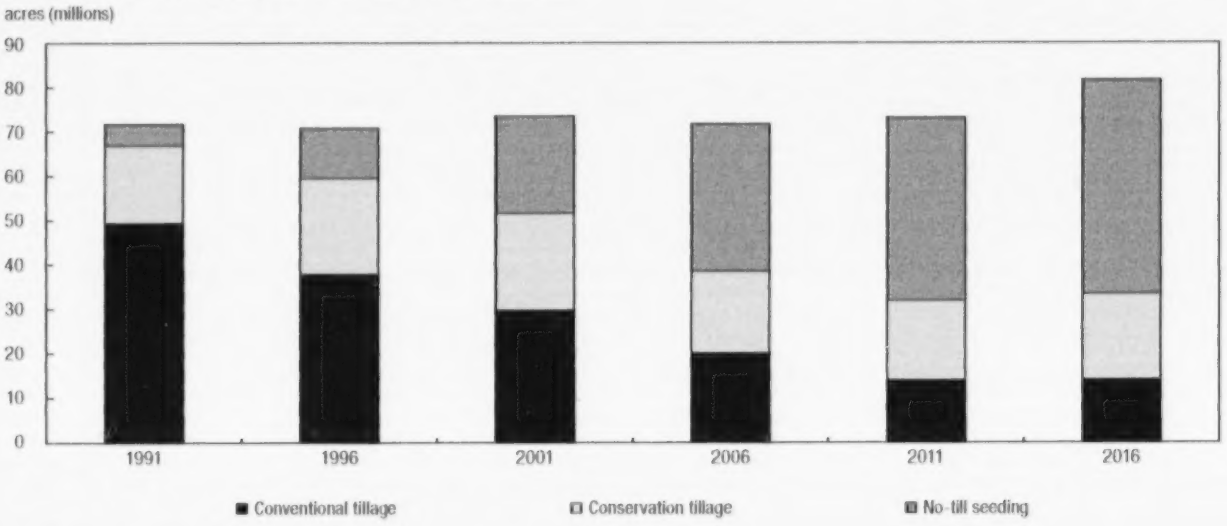
Irrigation can increase crop performance and yield, as well as enable crops to grow in locations with insufficient rainfall. Irrigated land increased by 331,917 acres to 2.2 million acres since the last Census, an increase of 17.4%. The majority of irrigated land (91.1%) was in Western Canada. Alberta continued to report the largest area of irrigated land in the country, with 67.9% of all irrigated land in 2015, followed by British Columbia with 12.6%. The area of irrigated land in Alberta increased 22.2% since the last Census to 1.5 million acres.

The total area prepared for seeding increased 11.7% between 2011 and 2016 from 73.1 million acres to 81.6 million acres (Chart 7). The total area tilled, either by conservation or conventional tillage practises, increased 5.0% from 31.9 million acres in 2011 to 33.5 million acres in 2016. This increase in tilled area was in contrast to the decrease in tilled area reported on previous Censuses.

While some crops perform well with no-till, there are other crops such as potatoes that require tillage. Tillage is also a mechanical form of weed control. Tillage may also be required for new varieties of crops with solid standability as the durable stocks and crop residue can be slow to decompose.

The total area prepared for seeding is split into three categories, reflecting differences in the level of soil movement during seedbed preparation. Conservation tillage retains most of the residue from the previous crop on the surface, while conventional tillage incorporates most of the crop residue into the soil. No-till seeding inserts seeds into minimally disturbed soil. No-till seeding requires fewer passes over the field, thereby reducing fuel and labour costs.

Chart 7
Total area tilled by tillage practices, Canada, 1991 to 2016



Sources: CANSIM tables 004-0010 and 004-0205.

No-till accounted for the largest percentage of the land prepared for seeding, rising 16.8% across Canada since 2011 to 48.2 million acres. Prince Edward Island, Ontario and Manitoba were the only provinces not to see an increase in no-tilled area between 2011 and 2016.

The acreage of conservation tillage in Canada increased by 7.7% to 19.3 million acres since the last Census. Manitoba had the highest proportion of agricultural operations reporting conservation tillage in 2016, followed by Quebec, Ontario and Saskatchewan.

The acreage of conventional tillage increased by 1.6% since 2011 to 14.1 million acres. This is in contrast to decreases seen every census cycle since 1991. The number of agricultural operations practising conventional tillage decreased by 7.9%. Manitoba was the only province where the number of agricultural operations using conventional tillage increased.

Inputs an essential part of agricultural operation management

Crop inputs are a necessary element of on-going agricultural operation management. The movement from hay to cash crops has resulted in an increase in the use of crop inputs. Often used as preventative measures, inputs can be applied before outbreaks of pests or diseases to protect crops instead of combating existing problems and compromising quality and yields. In 2016, 59.3% of all agricultural operations reported the use of inputs, an increase from 56.4% in 2011.

All types of inputs reported on the Census rose across Canada since 2010, with the use of fungicides increasing the most (69.8%). Fungicide application is used preventatively to suppress fusarium head blight, which affects cereal crops and reduces grain yield and quantity.

Herbicides were applied to 72.4 million acres in Canada in 2015, having increased 9.8% since 2010 (Chart 8).

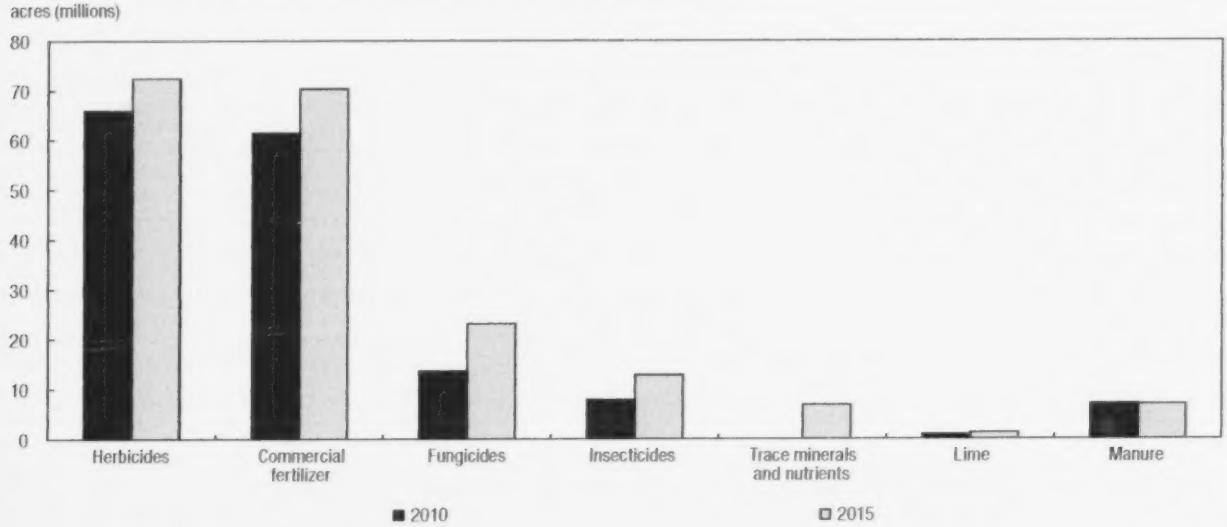
Commercial fertilizers were applied to 70.4 million acres across Canada in 2016 and increased 14.3% since 2010. The application of fertilizers compensate for the nutrients removed from the soil by the crop.

Fungicides were applied to 23.1 million acres in 2016 compared with 13.6 million acres in 2011. Insecticide application increased 64.9% since 2010 from 7.8 million acres to 12.8 million acres.

Trace minerals and nutrients were applied to 6.8 million acres in 2015. This was the first time the use of trace minerals and nutrients was collected on the Census.

The area of lime application, used to counter high soil acidity levels, increased 31.7% to 1.3 million acres. The area of land to which manure was applied remained relatively stable between 2010 and 2015, decreasing 1.3% between census years.

Chart 8
Total area of inputs used on agricultural land, Canada, 2010 and 2015



Sources: CANSIM tables 004-0206 and 004-0207.